In line with our policy of constant improvement we are pleased to announce another regular feature in each issue of TELEPHONE ENGINEER. Starting in the August issue Ray Blain will author a series of complete articles dealing with plant, maintenance, outside construction, and all other subjects pertaining to practical telephone problems. Fully illustrated, with each article complete in one issue, will make, in our opinion, one of the most popular features we have ever presented.

▼

Rambler is back on the job again and his travels, experiences, and foibles will be supplemented in months to come by "favorite stories" of telephone men. The many comments received on his recent travels has led him back into active harness.

▼

Glowing reports on the recent conventions continue to pour in. The Pennsylvania meeting at York, was, according to H. M. Stewart, its active and able secretary, one of the most enthusiastic its members have enjoyed in recent years. Arch MacKinnon, the popular secretary of the New York Association informs us their meeting was second to none. Reports from the West Coast are equally as glowing. The National Association officials led by Louis Pitcher have attended practically every state meeting and their talks on the national situation has acted as a welding link to Independents all over the country.

TELEPHONE ENGINEER

MANAGEMENT • ENGINEERING • MAINTENANCE

Vol. 42 No. 7 **July, 1938**

CONTENTS

- Across the Editor's Desk..... 12
- Editorial 14
- "Tapping In" on Washington
  By Roland C. Davies..... 15
- Convention Dates..... 16
- Convention Reports..... 18
- Local Test Desk Operation—Part XIV
  By C. F. Curtiss..... 19
- Vacation Hint—Motor to Mexico
  By P. Kerr Higgins..... 20
- Modernization—Eureka, Ill..... 24
- Line and Desk
  By Ray Blain, A. I. E. E..... 26
- Monthly Station Barometer..... 28
- Long Lines
  By R. A. Clark, Jr..... 30
- Rambler Rambles Again
  By J. A. Smith..... 32
- Index to Advertisers..... 38

Published Monthly by

Telephone Engineer Publishing Company

A Magazine devoted to the interests of the entire telephone industry—operating men and manufacturers.

SERVING THE FIVE BILLION DOLLAR TELEPHONE INDUSTRY

Founded in 1909

Office of Publication, Pontiac, Illinois. Executive and Editorial Offices 185 N. Wabash, Chicago, Illinois. Phone Franklin 4094. J. A. SMITH, President and Treasurer; RAY W. SMITH, Vice- President and Editor; L. M. BERRY, Vice-President; D. WEINER, Secretary Subscriptions: U. S., Cuba, Mexico, $1.00 Per Year; Canada, $2.00; In all Other Countries, $3.00. Single Copies, U. S. A., 15 cents.

In line with our policy of constant improvement we are pleased to announce another regular feature in each issue of TELEPHONE ENGINEER. Starting in the August issue Ray Blain will author a series of complete articles dealing with plant, maintenance, outside construction, and all other subjects pertaining to practical telephone problems. Fully illustrated, with each article complete in one issue, will make, in our opinion, one of the most popular features we have ever presented.

▼

Rambler is back on the job again and his travels, experiences, and foibles will be supplemented in months to come by "favorite stories" of telephone men. The many comments received on his recent travels has led him back into active harness.

▼

Glowing reports on the recent conventions continue to pour in. The Pennsylvania meeting at York, was, according to H. M. Stewart, its active and able secretary, one of the most enthusiastic its members have enjoyed in recent years. Arch MacKinnon, the popular secretary of the New York Association informs us their meeting was second to none. Reports from the West Coast are equally as glowing. The National Association officials led by Louis Pitcher have attended practically every state meeting and their talks on the national situation has acted as a welding link to Independents all over the country.

TELEPHONE ENGINEER

MANAGEMENT • ENGINEERING • MAINTENANCE

Vol. 42 No. 7 **July, 1938**

CONTENTS

- Across the Editor's Desk..... 12
- Editorial 14
- "Tapping In" on Washington
  By Roland C. Davies..... 15
- Convention Dates..... 16
- Convention Reports..... 18
- Local Test Desk Operation—Part XIV
  By C. F. Curtiss..... 19
- Vacation Hint—Motor to Mexico
  By P. Kerr Higgins..... 20
- Modernization—Eureka, Ill..... 24
- Line and Desk
  By Ray Blain, A. I. E. E..... 26
- Monthly Station Barometer..... 28
- Long Lines
  By R. A. Clark, Jr..... 30
- Rambler Rambles Again
  By J. A. Smith..... 32
- Index to Advertisers..... 38

Published Monthly by

Telephone Engineer Publishing Company

A Magazine devoted to the interests of the entire telephone industry—operating men and manufacturers.

SERVING THE FIVE BILLION DOLLAR TELEPHONE INDUSTRY

Founded in 1909

Office of Publication, Pontiac, Illinois. Executive and Editorial Offices 185 N. Wabash, Chicago, Illinois. Phone Franklin 4094. J. A. SMITH, President and Treasurer; RAY W. SMITH, Vice- President and Editor; L. M. BERRY, Vice-President; D. WEINER, Secretary Subscriptions: U. S., Cuba, Mexico, $1.00 Per Year; Canada, $2.00; In all Other Countries, $3.00. Single Copies, U. S. A., 15 cents.

ELAPSED TIME . . . TO THE SECOND

Recorded by the ELECTRIC Calculagraph

Most leading telephone managements are adopting the Electric Calculagraph — or are having their spring-driven models electrified. The reason: the electrified Calculagraph measures *and records* toll-call time *on the toll ticket* —TO THE SECOND!

Modern managements realize that overtime calls must be checked to the last second of time —and Calculagraph does exactly that!

The Electric Calculagraph (pictured above) is equipped with a self-starting synchronous motor for 60 cycle and either 20 or 110 volts regulated alternating current. THIS MECHANISM CAN BE FITTED TO YOUR MODEL 6 CALCULAGRAPH.

Send us the serial numbers of Calculagraphs in your exchange, and we will send you estimates of cost for converting them to electrics, together with complete information on the new Model 30.

THE CALCULAGRAPH COMPANY

50 Church Street Dept. 22 New York City

CALCULAGRAPH

THE ELAPSED TIME RECORDER

Editorial

Continued Tax Increases Certain To Bring Higher Telephone Rates

With the convening of 39 state legislatures next January, the telephone industry will again face a problem which has been a most serious one with it for the past few years—that of possible enactment of legislation providing for increases in its taxes.

For several years telephone companies and public utilities have been "goats" for state legislatures in providing revenues for so-called emergencies and relief to the point where they are carrying more than their share of the burden. In many cases this load is more than some telephone companies can safely carry.

As there has been no material improvement in the relief situation this year there is every reason to believe that state legislatures will endeavor to assess new and increased taxes against the telephone industry.

Telephone companies do not object and never have objected to carrying their just share of taxation, but they do object to being taxed more than their share and beyond their ability to pay.

The following table, comparing the increase in taxes assessed against Class A Independent telephone companies with the increase in their operating revenues from 1934 to 1937, clearly shows the danger of the upward trend of taxes assessed against the telephone industry:

Percentage of Increase in Taxes and Operating Revenues for Class A Independent Telephone Companies 1934-37

	Taxes	Operating Revenues
1937 over 1936	*Over 21%*	*Less than 7%*
1937 over 1935	*Over 45%*	*Less than 15%*
1937 over1934	*Over 55%*	*Less than 22%*
1937 over 1936	*Over 21%*	*Less than 7%*
1936 over 1935	*Over 19%*	*Less than 8%*
1935 over 1934	*Over 5%*	*Less than 7%*

Taxes paid by Class A Independent companies equalled $3.28 per telephone in service in 1934; $3.34 in 1935; $3.76 in 1936 and jumped to $4.36 in 1937.

Just how long telephone companies can stand these tremendous increases in taxes with their present income is a matter of grave concern. If taxes continue to mount there is one thing that seems almost certain to happen and that is a multitude of applications for higher rates will be presented to State Regulatory Commissions. That is the only recourse left open to a telephone company to provide additional revenue when it is no longer able to meet expenses.

State regulatory bodies themselves certainly are not helping the situation any when, on top of tremendous increases in taxes as well as other operating costs such as labor, etc., they demand or even think of demanding that a telephone company reduce its rates, or in adopting a practice of "nibbling" or "sniping" at telephone companies' revenues by endeavoring to obtain voluntary, or by other means, reduction or elimination of miscellaneous charges such as the handset charge, desk set charge, service connection and move charges.

It certainly would not be out of line if every Independent telephone company made a thorough and comprehensive analysis of its income, expenses and return, etc., and if additional revenue is needed to meet expenses and provide a reasonable return, they certainly should consider the application of higher rates.

TELEPHONE ENGINEER
MANAGEMENT • ENGINEERING • MAINTENANCE

JULY, 1938

"Tapping In" On Washington

By ROLAND C. DAVIES
Editor
Telecommunications Reports

BEFORE the summer vacation season tended to slow up the tempo of Washington affairs, the Federal Communications Commission took two important steps of interest to the telephone industry—the consideration and study of the American Telephone and Telegraph Company's responses in the Telephone Investigation in the preparation of the Final Investigation report to Congress and the promulgation of a uniform system of accounts for Class C Telephone Companies with annual revenues between $25,000 and $50,000 to be effective next Jan. 1.

The windup of Congress, however, in the enactment of the Wages and Hours Act left a problem for the telephone industry, particularly the smaller companies of the Independent field. A ray of hope for the smaller Independents with small operating margins, especially in rural territories, for exemption from the ultimate requirements of 40 cents an hour and 40 hour week was felt to exist in a section of the new statue—Section 13 a (2). This provision exempts from all provisions of the Wages-Hours act all "servicing" establishments which had the greater part of their business in intrastate operations. It is expected that the Independent telephone industry will ask the new Wages-Hours Administration for a speedy interpretation of this section of the act to determine whether or not intrastate telephone companies come within the definition of "servicing" companies. This section was interpreted as comparable to the Section 2 (b) (2) of the Communications Act which freed all telephone companies with solely physical connections and with no interlocking control from full subjection to the FCC regulation.

● The decision of the FCC to give "appropriate study and consideration" to the responses of the A. T. & T. in the Telephone Investigation in the formulation of its Final Report on the Investigation which it will submit to the next Congress was regarded as most significant. First, it indicated not only did the majority of the Commission recognize ***that the Investigation had been too ex-parte and one-sided but also the Commission appeared to realize it would be subject to criticism from Congress for conducting this type of an inquiry.***

If the FCC does weigh carefully the comments of the A. T. & T. which answered the charges of 41 exhibits of the Telephone Investigation staff, it is believed that the Final Report on the Telephone Investigation will not contain the sweeping indictments and censure of the A. T. & T. and Bell System in the so-called Proposed Report drafted by Commissioner Paul A. Walker and the Investigation staff. In all probability, the Final Report also should result in toning down to a considerable extent or should eliminate the more drastic recommendations for increased regulatory powers for the FCC such as control over managerial policies and regulations of Western Electric costs and prices.

THE A. T. & T. comments were filed with the FCC in the fall of 1937, but were rejected by Commissioner Walker because they did not conform to his instructions at the final Telephone Investigation hearing on June 30, 1937, when he agreed to permit factual corrections of the Investigators' exhibits to be submitted. At the time of the release of the Proposed Report to Congress by Commissioner Walker, it will be recalled that Commissioner Craven stated that "more could have been accomplished and better feeling would have existed" if the A. T. & T. had been accorded an opportunity to present rebuttal testimony.

Even though the FCC has agreed to study the A. T. & T. responses legal observers feel that these written comments are not an adequate substitute for cross-examination and rebuttal testimony. Furthermore, the A. T. & T. responses were not made a part of the Investigation record by the recent FCC order for their study and consideration so their weight as evidence is thus diminished in value to that extent. However, the FCC probably took the only feasible step for any attempt to remedy the ex-parte character of the Investigation, because it did not have and undoubtedly could not get any appropriation to reopen the Investigation hearings to permit cross-examination and rebuttal testimony by the A. T. & T., Bell System and Independent industry.

● The drafting of the Final Telephone Report by the FCC will be undertaken during this summer and fall so as to have the document ready for submis-

sion to the new Congress next January. The groundwork in the formulation of the Final Report will be fashioned by both the regular Commission staff and by a small group of former Investigation staff members who were retained for this purpose. The small Investigation unit, headed by Holmes Baldridge, former counsel-in-charge of the Investigation, will also conduct further research activities into telephone regulation along lines developed by the section which had been operating under special appropriation that ended last July 1.

The idea of continuing the small Investigation unit, it is speculated, may lead to the Final Telephone Report taking the following form: first, the charges and censure of the various phases of the A. T. & T. and Bell System activities and operations will be set forth as in the Proposed Report, then the responses of the A. T. & T. and in rebuttal to the telephone company's views a counter-reply by the FCC.

THE tenor of the FCC Final Telephone Report, in the last analysis, conceivably will be branded with the influence of political and other Washington events. The results of the Congressional elections next November on the axis of pro and anti New Deal victories and the findings and delvings of the Congressional-Executive anti-monopoly inquiry which is being launched this summer and will get under full swing next fall are two potent influences. The anti-monopoly study will undoubtedly probe into the communications patent situation and possibly the banking and financial relationships of the A. T. & T., while the inquiry into the motion picture industry the operations of Electrical Research Products Inc. (ERPI), A. T. & T. subsidiary for non-telephonic apparatus, may come into the picture. ERPI, of course, has bulked in a dominant position in the sound film apparatus field and was a special subject of the Telephone Investigation.

Commissioner Case Reappointed

THE reappointment of Commissioner Norman S. Case by President Roosevelt to the FCC for a seven-year term after Senate confirmation at the next Congress continued upon the Commission an able and judicious member whose abilities tend to keep that agency on an even keel. A Republican former governor of Rhode Island with conservative or middle-road views, Commissioner Case has been alert to the problems of the Communications industry and is a proponent of fair and constructive regulation. His new term on the FCC also means that a Commissioner with a good background of knowledge of the telephone industry is retained in office.

CONVENTION SCHEDULE

Michigan Independent Telephone Association, Hotel Olds, Lansing, July 27 and 28.

The Illinois Telephone Association, Hotel Pere Marquette, Peoria, September 21, 22 and 23.

South Dakota Telephone Association, Mitchell, October 5 and 6.

United States Independent Telephone Association, Hotel Stevens, Chicago, October 18, 19, 20 and 21.

Independent Pioneer Telephone Association of the United States, Hotel Stevens, Chicago, Thursday, October 20.

Virginia Independent Telephone Association, Hotel John Marshall, Richmond, November 3 and 4.

Another interesting development of internal affairs at the FCC was the overwhelming defeat in the House of a resolution to investigate the radio industry and the Commission. Because Commissioner George Henry Payne had been a leading proponent of the inquiry and had failed to substantiate charges of radio lobbying in a hearing before the House Rules Committee, the debate in the House on the investigation resolution produced a barrage of criticism against his actions. In fact, Rep. Cox, veteran Georgia Democrat, termed Commissioner Payne as being irresponsible, unfit for his FCC post and having violated his oath of office.

● FCC Chairman McNinch, who made an excellent impression in his discussion of Commission affairs before the House Rules Committee, characterized the outstanding rejection by the House of the investigation as a "vote of confidence." **The Chairman pledged that the FCC would embark on "the orderly, fair, impartial and courageous administration of the Communication Act" and declared that he was going to carry through "with the public interest as my guiding star."**

The administration of the Commission by Chairman McNinch appears to be remedying many of the loose links and operations of the FCC and is regarded by many Washington observers as ending the "shakedown cruise" of the FCC so that from now on the Communications agency should pursue a straighter course in its policies and decisions.

Class C Telephone Accounting System

THE Class C. Telephone Companies were given a "present" July 1 of a new uniform system of accounts by the FCC which will become effective next Jan. 1. The companies to fall under the system will be those between $25,000 and $50,000 annual gross revenues. All telephone companies with less than $25,000 revenues must submit a sworn statement to the FCC to that effect before they are exempted.

The new Class C system will contain about one-half of the accounting classifications which are embraced in the existing Class A system and 50 less classifications than are contained in the present Class B system. The new Class C system contains full explanations and illustrations regarding the accounting methods and classifications so that the telephone companies' management can understand its operations. An outstanding feature of the new Class C system is the treatment of block and drop wire classifications in the depreciation accounts rather than in operating expenses.

Final Reports of Rate And Research Department

WHAT may become a source of data and material for state Commissions in their telephone regulatory activities was produced by the FCC in the final reports of its Telephone Rate and Research Department, which ceased its evistence July 1. The final reports of this department, an arm of the Telephone Investigation, which was headed by Telephone Rate Counsel Carl I. Wheat, included a highly important analysis of the "Rate of Return for Telephone Companies." Prices and pricing policies of Western Electric and the license contract relationships between the A. T. & T. and Bell System companies.

● One of the major recommendations by Mr. Wheat's department was that another material reduction in long distance telephone rates should be effected immediately. He also urged the continuance of the Rate and Research Department to keep a constant check on the telephone industry and to aid state commissions in their regulation of the Bell System companies.

In the Rate of Return and study, the Department stressed that the rate of return was the regulatory "Siamese twin" of the rate base and should be designated the "fundamental measure upon which consumer rates must be based." The Wheat report gave the following "yardstick" degnition of a

fair rate of return—"the primary economic function of return is to enable the corporation to maintain its service upon an adequate level; to survive, and to obtain additional capital, as and when required, upon the most reasonable 'cost of money' basis." He advocated that the accent of regulation should be placed on the telephone company's "reasonable and essential" needs of capital and upon the cost of money in obtaining that capital.

In the report on depreciation, Mr. Wheat, who was the former general counsel of the California Railroad Commission and former utility counsel of Los Angeles, seemed to lean—rather naturally because of his California service—to the sinking fund method. The sinking fund method, which is used by the California Commission, the FCC report contended, would not do injustice to the Bell System. He contended that a constructive plan would be to leave the accounting for purely physical deterioration on the straight line basis and adopt the sinking fund method for functional retirement causes.

Like the Telephone Investigation, the Rate and Research Department in its report condemned the accounting systems of the Western Electric Co. He urged that the FCC should launch a move to have a satisfactory accounting system for regulatory purposes instituted in Western Electric and posed the idea that through such an accounting system the Federal Commission could determine whether or not Western Electric as the manufacturing and purchasing agent of the Bell System represents an asset or a liability for the Bell System from the financial viewpoint.

Miscellaneous Notes

THE Rochester, N. Y., Telephone Corporation is going to appeal to the U. S. Supreme Court the recent decision of the three-judge Federal court which held that it was fully subject to the entire Communications Act because of the one-third common stock interest and the large preferred stock ownership of the New York (Bell) Telephone Co. The outstanding feature of the three-judge court decision was that it held control does not have to be legal majority ownership of voting stock but can be exercised in a indirect or even negative way such as certain veto powers as were given the New York Telephone Co. The decision was considered an outstanding victory for the FCC.

FCC Chairman Frank R. McNinch will be a leading speaker at the annual convention of the National Association of Railroad and Utilities Commissioners next November in New Orleans. He will discuss cooperation between the FCC and state commissions.

○ In an effort to define exactly the line of jurisdiction between the FCC and state commissions over telephone operations and rates, the FCC has asked the Kansas and Missouri Commissions to join in an investigation of the recently instituted extended exchange area by the Southwestern Bell Telephone Co. in Greater Kansas City which takes in territory in those two states. The FCC is not seeking jurisdiction over the extended exchange rates but feels tariffs in such interstate operations should be filed with it.

— END —

Minnesota Commission Order Vacated

On December 21, 1937 the Minnesota Railroad and Warehouse Commission ordered an REA cooperative to pay a telephone company the cost of material for metallicizing the telephone circuits before energizing its power lines. The case was appealed to the District Court where the order was vacated on the grounds that the Commission has no authority to assess damages.

Twins Serve 50 Years

Left to Right: Mr. Richard Hinde; Mr. J. Nixon, Works Manager; Mr. A. F. Bennett, Chief Engineer; Mr. T. A. Eades, Managing Director; Sir Alexander Roger, Chairman of Directors; Mr. Charles Hinde; and Mr. F. C. Burstall, Manager.

Charles Hinde and Richard Hinde, skilled craftsmen in an Experimental Department of the Strowger Works, Liverpool, Automatic Telephone & Electric Co.. Ltd., were on Monday, May 30th presented with gold medals and substantial cheques by Sir Alexander Roger, Chairman of the Company, to commemorate 50 years of unbroken service. The medals were in the shape of automatic telephone dials, and each of the ten "finger-holes" was represented by a ruby, there being one for each 5 years of service. To make their record even more remarkable, each of the twins has been absent through illness for only 3 weeks throughout the whole of the 50 years.

Exchange In Missouri Sold

The El Dorado Springs (Mo.) telephone exchange, owned and operated by the Missouri Union Telephone Co. whose general office is in St. Louis, was sold during June to Walter Tough, of Dederick. The property passed to the new owner the first of July according to L. F. Cross, the former manager.

A. T. & T. Quorum Boosted to 40 Percent

American Telephone & Telegraph Company has increased the amount of stock necessary to constitute a quorum at stockholders' meeting to 40 per cent of the total outstanding from 25 per cent, it was disclosed in June.

The action was taken at the suggestion of the New York Stock Exchange in line with that organization's move to induce corporations generally to give shareholders adequate representation at meetings.

In the case of American Telephone, however, it was pointed out that even under a 25 per cent quorum the company invariably had more than a majority of its stock represented at stockholders' meetings.

CONVENTION REPORTS

THE last convention of the Pennsylvania State Telephone and Traffic Association and the first convention of the Pennsylvania Independent Telephone Association was held at the Yorktown Hotel, York, June 2, 3, and 4. The change in by-laws as part of the reorganization plan, resulted in a new name for the Association.

Besides re-electing officers and directors for the current year, the assemblage was marked by its enthusiasm and greater attendance than in many years past. Officers re-elected were: John H. Wright, president; Joseph F. Stockwell, first vice president; Granville S. Herbert, second vice president; H. M. Stewart, executive secretary; and M. E. Cunningham, secretary-treasurer.

Directors are as follows: A. O. Black, Butler; C. E. Eaby, Ephrata; Harry M. Engh, Erie; A. M. Gibson, Sheffield; G. S. Herbert, Harrisburg; H. A. Oberdorf, Columbia; T. B. Rudy, York; K. B. Schotte, Kittanning; J. N. Scott, Waynesburg; Joseph F. Stockwell, Philadelphia; and John H. Wright, Jamestown, New York.

With President Wright in the chair the convention was called to order on the afternoon of June 2 with the president's annual report being delivered immediately. His discussion touched on all phases of the business and especially so in regard to new laws and the Associations' part in relieving some of the burden of the member companies. He discussed at some length the proposed report of the FCC on the A. T. & T. investigation as he is one of the best informed Independents on this subject in the industry.

Louis Pitcher, executive vice president, of the United States Independent Telephone Association gave his report on the national situation, as well as discussing the effect the proposed minimum wage law would have on the telephone industry.

● This address was followed by one delivered by E. W. Olschner, chief engineer of the Carolina Telephone & Telegraph Company of Tarboro, North Carolina . At the conclusion of his address, he introduced Mr. John Winn of New York, president of the General Telephone Corporation, who spoke briefly. Colonel Gustav Hirsch was also introduced at this session.

Thursday evening President Wright entertained with moving pictures which depicted some of his travels and a portion showing many Pennsylvania telephone people in action.

One of the features of the entire meeting was the address of J. Warren Safford, president of the Troy Telephone Company, Troy, Ohio, former president and now vice president of the Ohio Association. His paper was entitled "Can you Make It Alone?" Copies of his address are available to those interested. This address was followed by one from Phillip C. Staples, president of the Bell Telephone Company of Philadelphia, Pennsylvania. William F. Paca, Oil City, a real telephone Independent pioneer, also entertained the meeting with his reminiscences of the telephone business before the turn of the century.

The traffic conference was held June 3, with an all day session. The large attendance made this feature a decided success. Officials state it will be a regular feature of each convention in the future.

● Entertainment in the form of a banquet and dance was provided with the feature provided by Andrew J. Trumbull of Cleveland. His impersonation of the late Will Rogers was remarkable.

Discussion of the REA problem by C. C. Deering, Des Moines, secretary of the United States Independent Telephone Association, was very complete. Questions from the floor on the various phases of this problem resulted in open discussion.

After action of the directors who voted at the regular session to support protection of the industry from undue interference and confiscation by any rural electrification organization, and agreeing that the Association should remain alert to the question of continuing property records and endeavor to relieve its members of undue burdening by more expensive accounting systems, the meeting adjourned. Attending his first convention of the Pennsylvania Association since his appointment as its executive secretary last year, H. M. Stewart was the recipient of many congratulations from those in attendance.

New York Association Meets At Rochester

JOHN T. Boylan, Rochester, president of the Rochester Telephone Corporation, was re-elected president of the New York State Telephone Association at their annual convention held at the Seneca Hotel, Rochester June 7, 8, and 9. Several moves to strengthen position of member companies resulted in a decision to study by-laws for the purpose of making changes providing for broader representation of small companies on the executive board.

Smaller companies provided more delegates to the convention than they have in many years past. They were rewarded by the above action and a most entertaining and enthusiastic meeting.

During the afternoon of June 7, The Stromberg-Carlson Telephone Manufacturing Company and the Rochester Telephone Corporation acted as hosts. Eugene Reinke and J. G. Carrit arranged for a golf tournament during the afternoon and the Stromberg-Carlson Company entertained with a stag dinner that evening at the club. Entertainment for non golfers consisted of visits to the Stromberg-Carlson plant or to the exchanges of the Rochester Telephone Corporation. With Robert M. Bruce of the Rochester Telephone Corporation as toastmaster the annual dinner and dance was both unusual and entertaining.

● Officers selected for the coming year:

President, John P. Boylan; treasurer, Charles M. Beattie; assistant secretary-treasurer, S. G. Bowie, all of Rochester; vice-president, H. H. Griswold, of Phelps; and secretary, A. R. MacKinnon, Albany.

Re-elected as directors were:

Mr. Boylan; Frank D. Fancher, Middletown; Mr. Griswold, Phelps; Arthur R. Maytum, Fredonia; Louis H. Meyer, Johnstown; Clifford Sayer, Chatham; William A. Seely, Norwich; John Troy, Rhinebeck, and Lloyd C. Wright, Jamestown.

With President Boylan in the chair, opening session was on the morning of June 8. His words of welcome and discussion of the current trend of telephone companies on legislative affairs were quite timely. Commendation of the work of Secretary MacKinnon since his appointment to that position voiced the opinion of the entire membership.

Presenting his annual report MacKinnon covered many subjects. Of much importance was his discussion of the plight of the smaller companies and the necessity of making finances available to younger men who will have to carry on as Independents. His address was one of the most complete as a discussion of association affairs of any delivered at association meetings during the year.

● Other speakers were Louis Pitcher of the National Association; State Comptoller Morris S. Tremaine, Albany; Seaborn N. Pines, Syracuse; Alfred L. Geiger, general attorney of the National Associotion, Washington, D. C.; Gay H. Brown, counsel of the New York Public Service Commission; Frank J. Lovejoy, New York; D. H. Campbell, Rochester Tel. Corp., and Gary E. Slusher, traffic superintendent of the Upstate Tel. Corp., Jamestown. Concluding the program, Mabel P. Sellvin, chief operator, Jamestown Tel. Corp. addressed the convention on "The Necessity and Benefit of Co-operation."

General Electric presented a demonstration under the direction of William A. Gluesing showing the many uses and forms of vacuum tubes, illustrating their application in various ways.

Local Test Desk Operation

By

C. F. CURTISS

Being necessary to test into subscriber's station and other telephone apparatus containing reactance, this subject will be discussed in this installment

PART XIV

THE conductance of an alternating current circuit is a quantity by which the E. M. F. must be multiplied to give the component of the current parrallel to the E. M. F. The conductance is represented by the letter "G" and is numerically equal by formula to: $G=R/R^2+X^2=R/Z^2$, where "R" equals resistance, "Z" the impedance, and "X" reactance.

The susceptance is a quantity by which the E. M. F. must be multiplied to give the component of the current perpendicular to the E. M. F. The susceptance is represented by the letter "b" and is numerically equal by formula to $b=X/R^2+X^2=X/Z^2$. Whereas the conductance of a direct current circuit, is the reciprocal of the resistance, while for alternating current this actual conductance is not used, but a value called the effective conductance is used instead. The reciprocal of the impedance is called the admittance and is represented by the letter "Y".

The admittance of a circuit bears the same relation to the conductance and susceptance as exists between the impedance, resistance, and reactance, or by formula: $Y=\sqrt{G^2+b^2}$. That is, the admittance is equal to the square root of the sum of the squares of the conductance and susceptance.

Since the admittance is equal to the reciprocal of the impedance, and since the impedance equals the E. M. F. divided by the current, then the admittance must be equal to the current divided by the E. M. F. or by formula: $Y=I/E$.

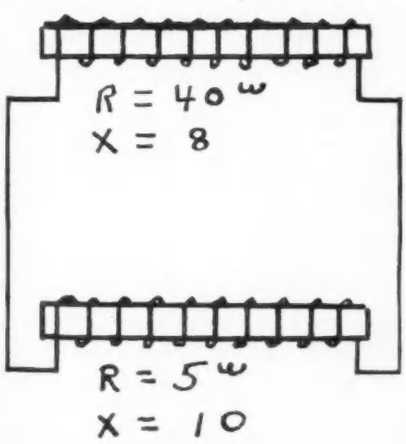
● To calculate the combine impedance of a number of pieces of inductive apparatus connected in parallel, it is first necessary to find the effective conductance (G) of each piece separately, which is equal to the resistance of the apparatus, divided by the sum of the squares of it's resistance and reactance. Second, the susceptance (b, of each piece is found separately, which is equal to the reactance of the apparatus divided by the sum of the squares of it's resistance and reactance. Third, the sum of the conductance is found, and their sum squared. Fourth, the sum of the susceptances is found, and their sum squared. Fifth, the admittance is equal to the square root of the sum of the squares of the total conductances and total susceptances. Sixth, since the combined impedance is equal to the reciprocal of the admittance, then the combined impedance must be equal to one divided by the square root of the sum of the squares of the total conductances and total susceptances, or equal to one divided by the admittance. By formula: Joint Impedance equals $I/\sqrt{G^2+b^2}=I/Y$.

Problem: Figure I shows a circuit consisting of two electromagnets connected together in parallel. One electromagnet has a resistance of 4 ohms and a reactance of 8 ohms. The other electromagnet has a resistance of 5 ohms and a reactance of 10 ohms. If the two electromagnets together, require 0.5 amperes, what E. M. F. must be applied to the circuit? How much current flows through each electromagnet. For electromagnet No. 1 $G=R/R^2+X^2$ or $4/16+64=4/80=0.05$. For electromagnet No. 2 equals $G=R/R^2+X^2$ or $5/25+100=5/125=0.04$. The susceptance of electromagnet No. 1 equals $b=X/R^2+X^2$ or $8/16+64=\frac{8}{80}=0.1$ The susceptance of the second electromagnet is $b=X/R^2+X^2$ or $10/25+100=10/125=0.08$.

THE square of the sum of the conductances (.05+.04) equals .09×.09=0.0081 and the square of the sum of the susceptance (.10+.08) .18×.18=0.0324. The admittance (Y) equals the square root of the sum of the squares of the conductance and susceptance or $Y=\sqrt{G^2+b^2}=\sqrt{.0081+.0324}=\sqrt{.0405}=0.201$.

The joint impedance equals $\frac{1}{Y}$ or

(Please turn to page 21)



(Figure 1)

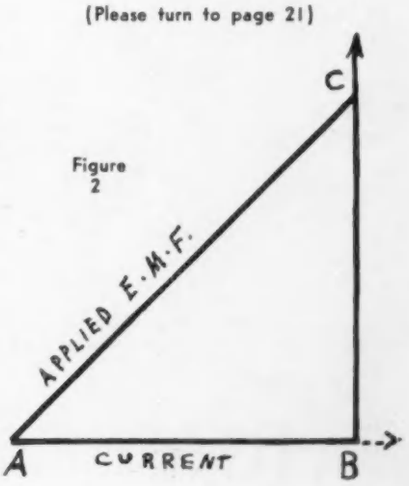


Figure 2

Maguey Plant—Extracting juice for making mescal, tequila, etc., strong native liquors.

Vacation Hint—

Motor to Mexico

Mr. P. K. Higgins continues his narration of a vacation trip through Old Mexico. Since the last issue which started the trip many have written for advance proofs to have the complete story before they followed his "tracks."

From your auto you can look straight down a sheer 2000 to 3000 foot drop. However the road is well protected, but speeding and carelessness are out of the question and if one makes twenty to thirty miles per hour, he is doing well. The views are so many, varied and beautiful that the tourist has no desire or incentive to rush. The grades are long and easy and we did not find it necessary to shift gear. A monument on the west side of the road indicates the summit. The road winds through some of the most stupendous mountain scenery to be seen anywhere. One point is called the "view of a thousand hills." Ahead lies the attractive village of Jacala, where we found a good American Restaurant. At Zimpan may be seen a beautiful church and some splendid Cypress trees, 42 feet around the base. Then there is the old Convent of Actopan, built in 1548. From the roof a beautiful view may be had.

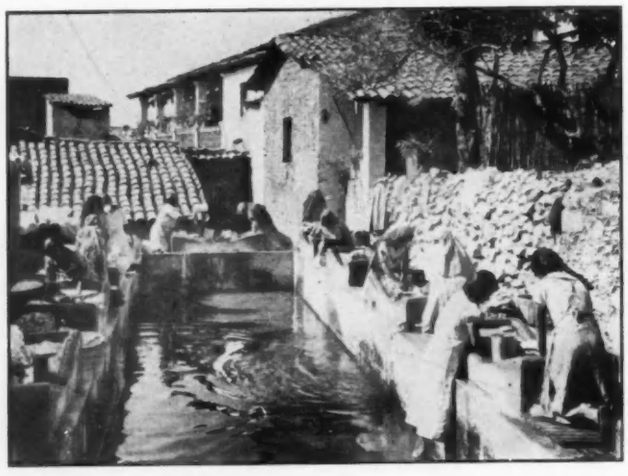
This part of the highway goes directly through vast fields of Maguey (looks like huge century plants) from which is made paper, vinegar, molasses, medicines, rope and the very popular native drink Pulque (a little stronger than beer) tequila and mescal, both very potent liquors.

Pachuca is the next city with a population of 45,000, a typical mining city, —the largest silver mining camp in Mexico, producing 15% of the world's silver. Accommodations at Pachuca are only fair, and being near Mexico City, one would prefer to go on rather than stay here over night. Silver has been mined here for many centuries, (long before the Spaniards arrived), by the Aztecs. As we leave Tizayuca, we get our first view of the two famous volcanos capped with eternal snow.

At Venta de Carpio the road to the left leads to the pyramids fourteen miles away, which we visited later. Here we pass over a very old road with old stone walls on each side built centuries ago and one of the first roads on the continent. The walls were built to separate Lake San Cristobal from Lake Texcoco. All this land was at one time covered with water, but is now under cultivation.

As we approach Mexico City, we can see the bright tiled domes of Guadelupe Shrine in Villa Madero,—the most famous shrine in Mexico. About this point, we were stopped by the police who examined our papers and suggested that we take a guide and have him drive us to our Hotel in Mexico City. This is a splendid idea and costs only 56c in our money. These guides remain with the tourists until they are properly and satisfactorily located. They will offer their services if you wish in and around Mexico City later on.

All along the highway, about ten miles apart, are Police Camps or Cuartels with a detail of soldiers in each. These have been crude, temporary shelters, but fine modern buildings are now being built. These are for protection to tourists. In this country the soldiers seem to do police duty in addition to soldiering. These Cuartels are located on high ground for observation purposes and on some of the roads a detail of two men patrol definite sections of the highway. Every kind of domesticated animal is met on the highway notwithstanding notices prohibiting them. The new Mexican roads are excellent, but the others are awful! Moral: Keep to the paved roads.



Washday at Taxco. This is a common sight to the visitor. The charm and simplicity endears these customs so different from their northern neighbors.

POINTS OF INTEREST in and around Mexico City

1. Shrine of Guadelupe, Villa Madera, and on the highway (carrettera).
2. National Palace, built 1692, and Park Chapultepec, once an Aztec Fortress; now Mexico's White House.
3. The City markets,—especially San Juan, near the Alameda; also Merces.
4. The Monuments on the Paseo De La Reforma, a beautiful boulevard.
5. Palace of Fine Arts with its famous glass curtain.
6. National Museum with its Aztec Calendar on stone, Alban Jewels, etc.

7. Post Office facing Alameda, one of the largest in the world.

8. House of Tiles (Sanborn Restaurant).

9. University main building (many branches all over the city).

10. Aztec ruins near Cathedral.

11. Cathedral on the Zocala, largest in America, built 1573-1667 (site of Temple of the Aztecs).

12. "Fronton," if you like hand-ball ala Mexican "Jai Lai."

13. Tourists' Office (Government) for full information, near Post Office.

14. Many fine churches.

15. Outside of Mexico City are Xochimilco, Puebla, Cuernavaca, Taxco, Teotihuacan Pyramids (the Sun and the Moon), Convent of Acolman on way to Pyramids, Toluca (Market day on Friday).

16. On Sundays and holidays the star attraction is the bull fight in a splendid concrete arena holding 20,000 spectators (Mexico City). The Tenayuca Pyramid and many other places too numerous to mention are most interesting and seeing them depends entirely upon the time one can spend on the trip. None of the places mentioned, however, are far from Mexico City and many of them can be made in one day. Swimming pools are common throughout Mexico at Hotels and Tourists Courts.

Floating Gardens—Xochimilco

● The Alameda (Square) is located in the center of the City. The Zocala, another smaller Plaza or Square) is in front of the Cathedral.

A small sign on the buildings (very inconspicuous) shaped like an arrow and marked "Transito," indicates the direction for traffic on one way streets. One must be very careful to regard these signs; if one misses them, annoyances will result.

Mail sent to the General Delivery is hard to get in Mexico and telegrams are not much better. There is much room for improvement.

Every youngster knows the English words "Hello" and "O.K." and which sounds like "Watch-yer-car," which they will do for a few cents.

● Mexico City, the home of charm, reflects the latest in architecture and arts, superb villas, artistic balconies with their wrought iron casements, dreamy patios, beggar, taxies and horsemen. Noisy, but more interesting than many places in European countries. And by the way, enroute to or from Mexico City, be sure to get a "kid" (young goat) luncheon at Tom Powers, Sabinas Hildago, 32 miles from Laredo.

Guadelupe, about three miles from Mexico City, boasts the most sacred shrine in Mexico. This shrine was erected to Our Lady of Guadelupe and according to the legend, on this very spot she converted the Indian's Zarapa into a beautiful cloth bearing her own image. This is still preserved and is encased in a frame of pure gold. The railing about this altar is of solid silver and weighs fourteen tons. High up on a hill overlooking the cathedral is the chapel built in fourteen days by the Indians. It is simple, but interesting. Other altars in the large cathedral are of exquisitely carved wood, covered with gold leaf. All over the cathedral are flowers brought in fresh each day by the Indians. As a rule they are pure white, lilies predominating. One has to catch the spirit of the worshippers to appreciate what this shrine means. On December 12 each year, pilgrims from everywhere visit this shrine.

(Next month the "Bull Fight")

Test Desk Operation

(Continued from page 19)

1.000/.201=4.98 ohms (nearly).

At this point the E. M. F. required to cause a current of 0.5 amperes to flow through the circuit may be calculated by any one of two methons. First, since the admittance equals the current divided by the E. M. F. or Y=I/E, then the E. M. F. is equal to the current divided by the admittance or E=I/Y. Second, the E. M. F. equals the current times the impedance or E=IZ.

By the admittance method, the E. M. F. will be E=I/Y or .5/.201=2.49 volts.

By the impedance method the E. M. F. will be equal to the Joint Impedance times the current or .05 times 4.98= 2.49 volts. Hence 2.49 volts will be required for the circuit. The current through each electromagnet may be calculated by dividing the E. M. F. acting on each by the impedance of the apparatus.

● The E. M. F. then impressed on both electromagnets in figures 1 is 2.49 volts. The impedance of electromagnet number 1 is $Z=\sqrt{R^2+X^2}$ or $\sqrt{16+64}=\sqrt{80}=$ 8.94 ohms, and the current through this electromagnet will be I=E/R or 2.49 /8.94=0.28 amperes. The impedance of electromagnet number 2 equals $Z=\sqrt{^2+X^1}=\sqrt{25+100}=\sqrt{125}=11.1$ ohms, and the current through this electromagnet will be I=E/R=2.49/11.1=0.22 amperes. 0.28+0.22=.50 amperes the total required current value as given.

In order to overcome the reactance or counter E. M. F. which is produced by the self induction of an alternating current circuit so that current may flow, a component of the applied E. M. F. must be used, the force necessary being equal and in direct opposition to the counter E. M. F. of self induction. Another component, is required to overcome the resistance of the circuit, but this one must be in phase with the current, that is, in the same direction.

By self induction is meant the induction produced in a circuit by the induction of the current on itself at the moment of starting or stopping the current therein. Components should be considered as forces acting in circuits and are indicated by straight lines and actually represent forces into which the original force may be resolved. Figure 2 shows a right triangle representing the relations between the applied E. M. F. indicated by line "AC" and it's two components which are represented by lines "AB" and "BC" component phase with the current, while the "BC" component overcomes the counter E. M. F. of self induction and is at right angles to the current. The component "AB" is equal to the product found by multiplying the current by the resistance and the component "BC" is equal to the current multiplied by 2 pi fL. What this really gives is the volts drop and if "E r" represents the resistance drop, or line "A B" and "E x" the reactance drop, or line "B C", the applied E. M. F. of the circuit may be obtained by finding the square root of the sum of the squares "Er" and Ex" by formula: E. M. F. equals $\sqrt{Er^2+Ex^2}$.

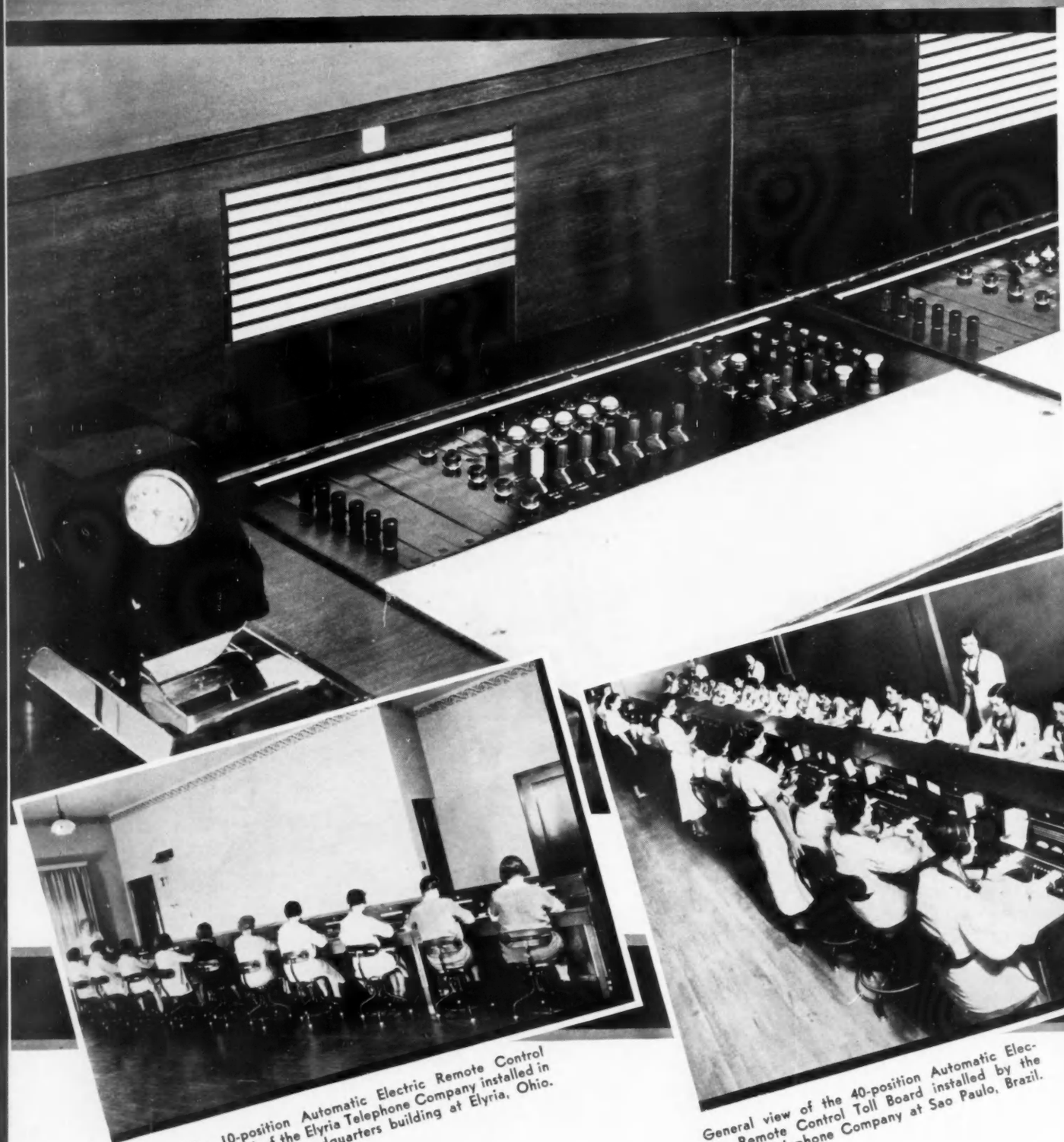
FROM the foregoing statement it will be readily seen that resistance is the quantity, which when multiplied by the current value, gives that component of the applied E. M. R. which is in phase with the current. Also, reactance is that quantity, which when multiplied by the current gives the component of the applied E. M. F. which is at right angles to the current.

Problem: Suppose two pieces of test desk apparatus, one non-inductive, and the other inductive, are connected together in series in an alternating current ringing circuit. If the resistance drop through the non-inductive apparatus is 26 volts and the reactance drop through the inductive apparatus is 70 volts, what is the implied E. M. F.?

Solution: E. M. F.$=\sqrt{Er^2+Ex^2}$ or $\sqrt{26^2+70^2}=\sqrt{676+4900}=\sqrt{5576}=75$ volts A. C.

The Automatic Electric

REMOTE CONTROL TOLL BOAR
BRINGS YOU THESE ADVANTAGE



This ci an operato ws the u of operati en secured m- plete all cords,

The 10-position Automatic Electric Remote Control Toll Board of the Elyria Telephone Company installed in the company's headquarters building at Elyria, Ohio.

General view of the 40-position Automatic Electric Remote Control Toll Board installed by the Brazilian Telephone Company at Sao Paulo, Brazil.

A

1 Provides Faster, Better Toll Service.

2 Enables Operators to Handle More Calls.

3 Reduces Dead Holding Time on Toll Circuits.

4 Increases Revenue from Existing Lines.

5 Improves Transmission.

Briefly, the Automatic Electric Remote Control Toll Board is the automatic idea applied to toll switching. It eliminates all cords, plugs and jacks—takes the cumbersome, time-wasting, fatigue-producing operations and turns them over to standard automatic switches, mounted in a room apart from the toll board. All that is left for the operator to perform are a few simple key operations, concerned solely with the control and supervision of the call. The results are:

1. Faster, better toll service. Studies made on a recent large installation, comparing average "before" and "after" connecting time to some twenty-six different points, showed reductions in time ranging from 37.8% to 95.6%.

2. More calls per operator. Since each operator can handle a large volume of calls with less effort and fatigue than formerly, operating costs are appreciably reduced.

3. Dead holding time is reduced. Important toll lines can consequently carry more traffic and their operating efficiency is proportionately increased.

4. Greater revenue from existing circuits. With shorter connecting time and reduced dead holding time, appreciably more traffic can be handled without adding to existing facilities.

5. Transmission is improved—since after the operator completes the call, the talking circuit is localized within the automatic switches. It is not looped to or through the toll switchboard except when the operator finds it necessary to be in on the circuit.

Standard Strowger switches, mounted on frames in a room apart from the toll board, perform all the mechanical functions of toll board operation with instant speed and precision.

Write for further information on this great forward advance in toll operation. Complete technical data sent promptly upon request.

AUTOMATIC ELECTRIC

MAKERS OF TELEPHONE, SIGNALING AND COMMUNICATION APPARATUS
ELECTRICAL ENGINEERS, DESIGNERS AND CONSULTANTS

Distributors in U. S. and Possessions:
AMERICAN AUTOMATIC ELECTRIC SALES CO. 1033 W. Van Buren St., Chicago, U. S. A.
Export Distributors: AUTOMATIC ELECTRIC SALES CO., LIMITED

Manager C. F. Melick in his office at the Eureka Telephone Co.

Modernization Completed at Eureka, Illinois

THE HISTORY of telephone service in the Eureka, Illinois, community is a story of enterprise and determined effort.

Eureka is located on U. S. Highway No. 24, twenty miles east of Peoria. It is the county seat of Woodford County and according to the latest federal census has a population of two thousand. Eureka College, with an enrollment of 250, and offering a 4-year Liberal Arts curriculum has been in operation in Eureka for 83 years. Graduates of Eureka College have gone out into the four corners of the world.

● Like many Illinois and Indiana towns of the same size and similar characteristics Eureka has no large industries but a number of small and medium sized ones. Its location with respect to the larger industrial operations of Peoria and East Peoria naturally fits it as the home of many a Peoria worker.

Several years ago the property now known as the Eureka Telephone Company came into the possession of M. F. Melick, father of the present owners, C. F. Melick and W. M. Melick. He was at that time president of the West Liberty, Iowa, Telephone Company.

January 1, 1913, C. F. Melick left the old home at West Liberty, Iowa, to take charge of the Eureka, Illinois, plant which his father had just acquired. W. M. Melick, his brother, came on to Eureka in March, 1914.

It is interesting to note, in passing, that in 1921 the West Liberty Telephone Company under management of the third son, Henry B. Melick, was cut over from magneto to common battery operation. Incidental to this program were the erection of a modern exchange building and the installation of a three-position Stromberg-Carlson multiple board.

DURING the depression years Eureka's Melick brothers carried on without losing subscribers or reducing rates by continuing to serve for months at a time subscribers whom they knew to be sound and perfectly reliable but who were temporarily financially embarrassed. In addition to this they took a chance on several others, and won, in practically every instance. As a result their abiding faith in humanity, and in the inherent honesty of most men, has had quite a boost.

As early as 1925 plans were formulated looking towards a full underground cable layout and today there is not a foot of aerial cable or open wire inside the corporate limits of Eureka.

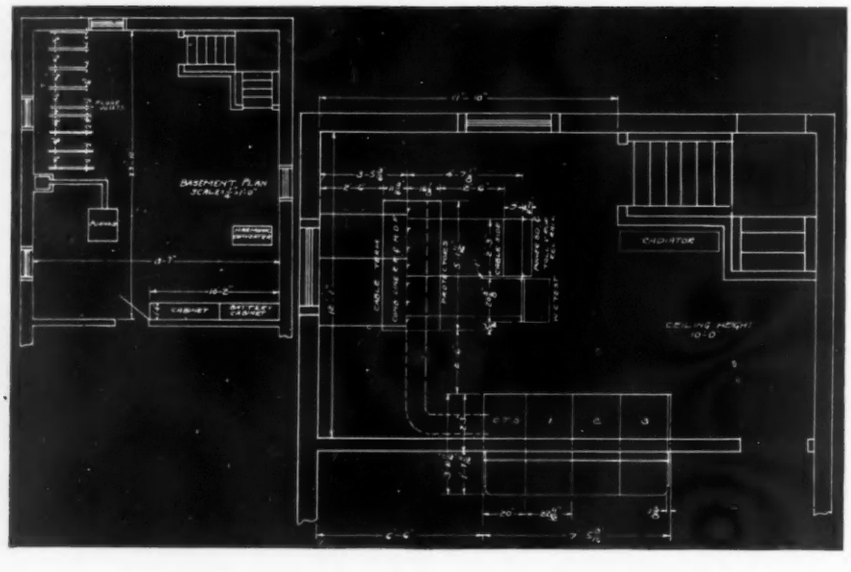
Realizing that magneto service was not sufficiently modern for this progressive community these forward-looking telephone men several years ago began moving toward the introduction of common battery service by installing special battery feed coils, produced for the trade at that time under the name Rodman Coils.

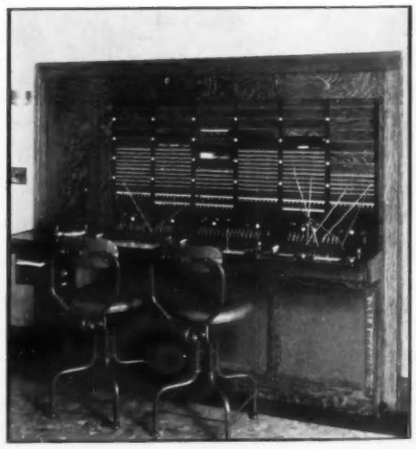
● Later an improved type of coil and mounting was adopted, the service having proven very popular.

Through the introduction of these coils and the acquainting of the subscribers with the value of common battery service it was not a difficult task to sell the community on the idea of full common battery with all the modern, service-bettering features.

Early in 1937 an investigation of new central office equipment was begun in order that plans for complete modernization of the Eureka exchange might be carried out. Trips were made with the representatives of different manu-

Floor Plan of Eureka, Ill. Exchange (Fig. 1)





Stromberg-Carlson Super Service Switchboard at Eureka Exchange (Fig. 2)

Rear of Eureka Switchboard with gates closed (Fig. 3)

facturers and finally came the day of great decision. Sales representatives from the manufacturers were present and bids were presented. But, before any decision was made all were treated to a big turkey dinner with "all the trimmings." This was a new idea in switchboard sales history. Generally the salesman is the host.

The equipment installed at Eureka consists of a three-position Stromberg-Carlson Super-Service board and associated apparatus including combined Main Distributing Frame and Line Relay Rack, Power Board, and Wire Chief's Test Unit — all disposed as shown on the floor plans seen in Fig. 1.

The duplicate five-frequency Harmonic converter, with complete testing equipment, Tungar Rectifier with TVR charge-control equipment and the storage battery are all located in the basement.

FIGURES 2, 3, and 4 of the switchboard, front and rear, clearly show the details of this unit, while Figure 5 gives one a very good idea of the Wire Chief's Test Panel and the Power Board. Eureka is not a toll center but it will be noted that toll test-jack equipment has been installed to adequately serve the toll line testing needs of the exchange.

All toll and rural line terminating equipment is of lamp signal type with the lamp arranged to repeat the code signal when stations on the same line ring each other.

The rural line equipment is so designed that any such line can be modified so as to provide common battery service by making a few simple changes at the Line Relay rack. Some of the Eureka rural subscribers are already using this service with great satisfaction.

A hobby of the owners of this exchange is to always have the building and all equipment in "spick and span" condition, ready for dress inspection.

(Please turn to page 29)

Do you ever stop to think how rarely, if ever, your telephone fails? Good telephone service is the result of an unusual combination of operating skill and dependable equipment. Our part is the equipment.

Gayle A. Boomer
PRESIDENT

Built for Service

MOST people take their telephone pretty much for granted.

Though rugged in construction, it contains no less than 248 separate parts which must fit together and function with such mechanical and electrical precision that you can talk over it—through the nationwide network of wires and cables and switchboards of the Bell System—anytime, anywhere.

One reason why this is possible is because the Western Electric Company, the manufacturing unit of the Bell System, makes telephone equipment in which service is the first consideration—since this equipment is built for long life and low maintenance cost. The telephone companies acquire this apparatus at favorable prices made possible by the economies of large scale production and Western Electric's policy of moderate profits.

The savings which your telephone company thus makes on its equipment help to offset increases in taxes, wages, and other elements in the cost of providing an increasingly complex service.

Thus Western Electric contributes its part in making Bell Telephone service dependable and economical.

Western Electric

BELL SYSTEM SERVICE
IS BASED ON
WESTERN ELECTRIC QUALITY

LINE and DESK

RAY BLAIN, Member A. I. E. E., Editor

Q. What type of grade clamps are recommended for use on aerial cable work?

A. All modern grade clamps now on the market are considered satisfactory. These clamps, properly installed, will prevent cable moving any appreciable amount.

Q. Should branch or feeder cables be connected direct into main cables?

A. We would say that ordinarily they should be, though in some cases they are cross-connected to the main cable. Some claim this system makes a more efficient cable system though this is a much disputed subject.

Q. Is the eye-bolt method of guying considered superior to the wrapped method?

A. Most construction men consider that it is. The wrapped guys are difficult to install and have a tendency to choke and crush the pole under the wraps. The eye-bolt method also generally gives better clearance on jointly used poles and is easy to install.

Q. Will you please tell us how we can make a manhole watertight?

A. This is most difficult and expensive task and ordinarily not necessary. Water in manholes ordinarily does no harm and it can be pumped out when repairs are necessary. We are advised by a reliable contractor that to make a manhole waterproof it is necessary that it be plastered on the outside and then painted with asphalt. It would appear that plastering and painting on the inside like a cistern would be satisfactory but we are advised that this is not the case. Plaster on the inside will seal water in but will not prevent water from the outside seeping in. Plaster on the outside of a manhole would be so expensive that it would be out of the question for ordinary purposes.

Q. We use a No. 10 copper wire run down our poles and coiled on the bottom for a ground. We are having some lightning trouble and would be pleased to have your opinion as to whether our ground connections are adequate?

A. This would depend on the nature of the soil and other local conditions. The wire in this manner has the disadvantage of not having as large a contact with the earth as would an approved type ground rod. To reach the permanent moisture level is the principal aim in selecting the proper length ground rod. The National Electric code states that driven electrodes "shall be driven, except where rock bottom is encountered, to a depth of at least eight feet, regardless of size or number of electrodes used." The 8' ground rod is a safe bet for you to try in your exchange.

Q. What kind of material should be used in pole line date nails?

A. A standard date nail is generally made of copper, aluminum or galvanized steel. These nails can be obtained with numerals depressed, raised or plain.

Q. What kind of solder is used in the lead burning method of cable repair?

A. Ordinary rosin core solder may be used but for best results stearine core is recommended. The rosin core may leave flux pockets in the lead which may cause trouble. The stearine burns clean and is not liable to cause trouble when using the lead burning method.

Q. What type of bins are considered best for use in a small storeroom to hold bolts, screws and small hardware?

A. We would suggest the all-metal revolving bin variety. This idea requires very little space but will hold a large quantity of material and keep it available for instant use. The cost is not expensive.

Q. What is the maximum pole spacing which can be used on rural lines by utilizing the modern high strength wire to best advantage?

A. In the old days 30 poles to the mile was considered maximum spacing with many companies. Now 15 poles per mile is not uncommon in some localities. Spacing of 450 ft. is sometimes used. This maximum spacing is not generally recommended to meet all conditions.

Q. Is it possible to obtain an outside type protected cable terminal of less than the standard eleven pair size?

A. Yes a small compact unit of this type, arranged for pole or wall mounting can be obtained in a 3, 5 or 7 pair size. Often these small terminals are more suited to a certain need than the larger size.

Q. Is the connecting block considered a desirable means for the splicing of inside house wire?

A That depends considerably on whether or not it will be unsightly. When a tap is to be taken off the line for an extension telephone the connecting block sometimes proves desirable. It also makes a convenient test point The new compression type sleeves makes the splicing of inside house wire convenient and inexpensive.

Q. What is meant by the new automatic method of battery charging in a telephone exchange?

A. We assume that you have reference to the methods which are accomplished in numerous ways of increasing the charging rate in proportion to the discharge rate on the telephone battery. With this system the rectifier practically carries the load and the battery merely acts as a noise killer and carries the load in case of a power failure. Some exchanges have eliminated their batteries entirely and operate from a rectifier entirely. When this is done and the commercial power is not 100 per cent reliable dry cell batteries are sometimes used for standby and to carry the exchange in periods of no power.

Q. What type and kind of simple test can be made on transmitters to determine their efficiency?

A. A simple test which we have found quite successful is to connect a millimeter in series with the transmitter on a telephone and watch the needle fluctuate as you talk in a normal tone. The transmitter under test may then be removed and a new one connected in the circuit and the fluctuations on the meter noted. If the old transmitter is not up to par it can be easily detected by this method of comparision.

Q. What means can best be used to remove dust from telephone equipment?

A. Some prefer to make use of the special portable vacuum cleaner for this purpose. This cleaner is equipped with various brushes and nozzles for removing the dust from delicate equipment so as to not cause contact trouble.

Q. Can the pole type drive hook be used on a building to attach a drop wire clamp to support parallel drop wire?

A. Ordinarily we would not recommend this practice. The pole hook is of the drive type and difficult to make hold on a thin wall. A small screw type hook is now available for this purpose and can be purchased at a reasonable cost.

BRING YOUR LIBRARY on TELEPHONE BOOKS UP-TO-DATE

NEW LIST — LOWEST PRICES

- **Book of Wireless Telephony and Telegraphy,** by A. F. Collins 1.65
- **Exploring Life,** by Thomas A. Watson 3.50
- **Introduction to the Development and Theory of Telephone Apparatus,** by G. D. Shepardson 3.50
- **Audel's Handy Book of Practical Electricity** 4.00
- **Audel's New Electric, 1 Library,** 12 volumes ..... each 1.50
- **Hawkins Electrical Guides,** 10 volumes, each complete 1.00
- **Hawkins Electrical Dictionary** 2.00
- **Drake's Telephone Handbook,** by D. P. Moreton 1.50
- **Telephony, Including Automatic Switching,** by Arthur Bessey Smith 2.50
- **Electrical Measurements and Meter Testing,** by D. P. Moreton 1.50
- **Electric Motors, Direct and Alternating,** by D. P. Moreton 1.50
- **Wiring Diagrams and Descriptions,** by Hourtsman and Tousley 1.50
- **Telephone Instruments, Their Operation and Management,** by W. H. Radcliffe 2.00
- **Practical Applied Electricity,** by D. P. Moreton 2.00
- **Signals & Speech,** by John Mills 2.00
- **Automatic Telephony,** by H. H. Harrison 2.75
- **Elements of Telephone Transmission,** by H. H. Harrison 2.00
- **Principles and Practice of Telephony,** by J. G. Mitchell 2.50
- **Telephone Communication,** by Wright and Puchstein 5.00
- **Automatic Telephony, Simplified,** by C. W. Brown 1.75
- **Inductive Coordination of Electric Power and Communication Circuits,** by Laurence J. Corbett 3.00
- **The Story of Independent Telephony,** by Harry B. MacMeal 1.00
- **Handbook of Engineering Fundamentals,** Ovid W. Eshbach 5.00
- **Public Utilities and the People,** by Henry Robinson
  Cloth bound 1.50
  Paper bound ..... .90
- **Electrical Engineers Handbook** (electric communication) by Harold Pender and Knox McIllwain 5.00
- **Electrical Communication,** by Albert 5.00
- **Telephone Circuit Diagrams,** by Heath 2.50
- **Telephone, Theory and Practice,** by Kempster B. Miller
  Vol. 1 Theory and Elements 5.00
  Vol. 2 Manual Switching and substation equipment 5.00
  Vol. 3 Automatic Switching and Auxiliary Equipment 5.00

Order Through

TELEPHONE ENGINEER

The LONGER it LASTS ...the LESS it COSTS!

The *true* cost of telephone wire can be measured only in one way—in terms of years of service.

Measured in this way, long-lasting Whitney Blake wires prove themselves remarkably economical. Whitney Blake's use of tougher, carefully selected materials results in long service.

Whitney Blake wires are available in Copperweld, Bronze or Copper ... from the distributor, Graybar.

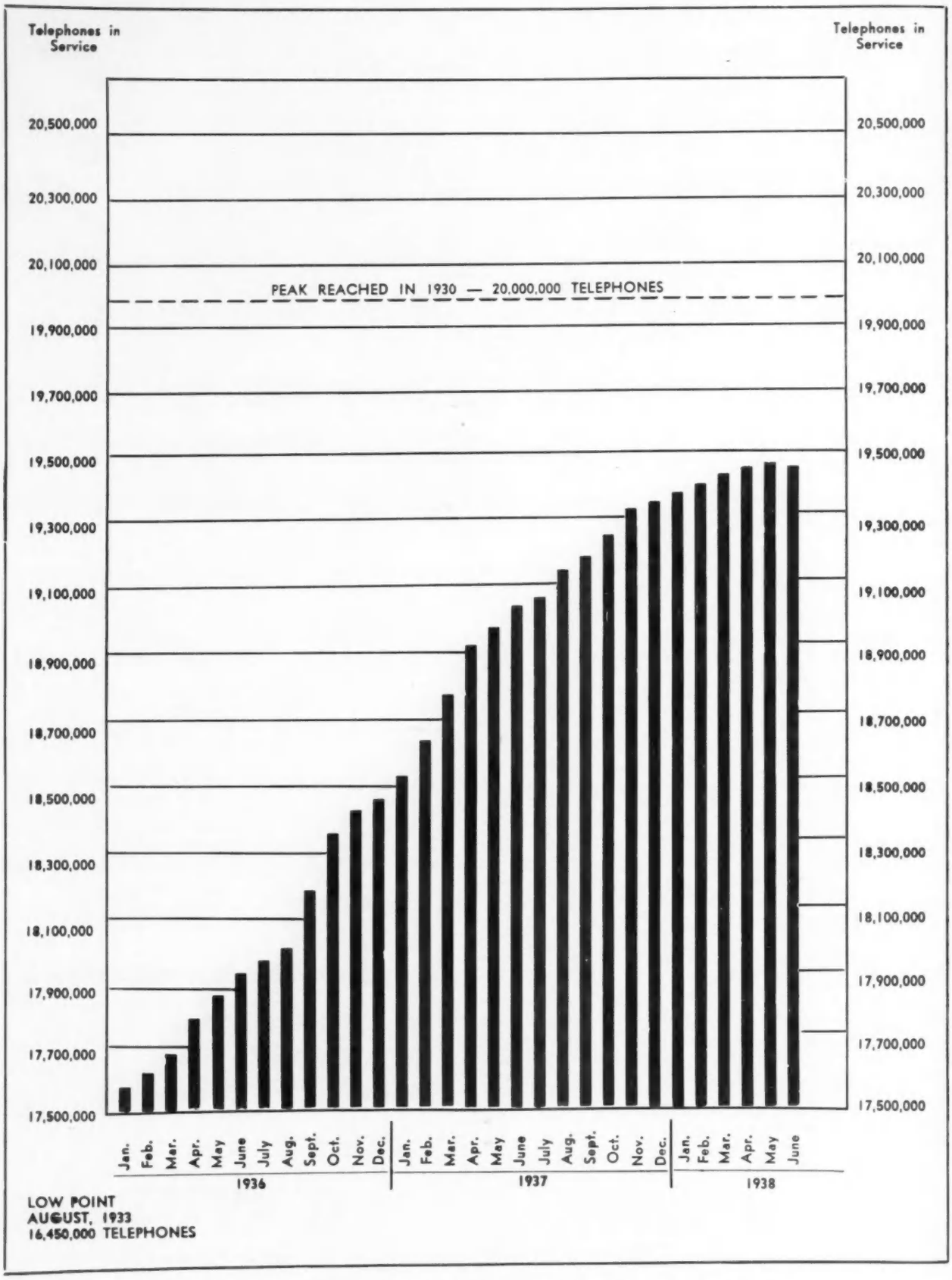
WHITNEY BLAKE TELEPHONE WIRE

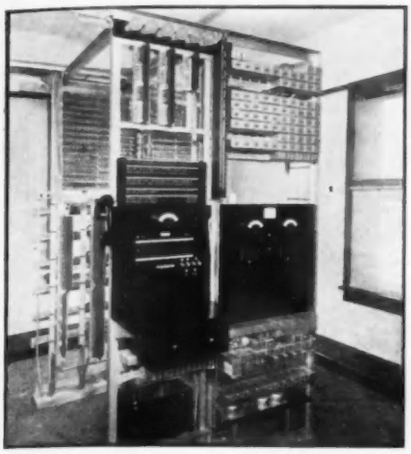
distributed by

GraybaR

OFFICES IN 85 PRINCIPAL CITIES. EXECUTIVE OFFICES: GRAYBAR BLDG., N.Y.

Monthly Telephone Station Barometer





Wire Chief's Test Panel and The Power Board at Eureka, Ill. Exchange (Fig. 5)

Eureka Modernizes

(Continued from page 25)

A corner of Manager C. F. Melick's private office, shown in Figure 6 illustrates this very forcibly.

January seventh the management held a reception, or "open house" for friends and subscribers so that all who wanted to do so might acquaint themselves with the new apparatus installed by the telephone company. About two hundred visitors registered while several passed through and examined the plant without attending to that formality. Messages of congratulations were received from many other telephone companies while floral greetings came in from many sources.

● A district meeting of the Illinois Telephone Association was held at Eureka June 16th. All of the visiting telephone people took advantage of the opportunity to inspect the plant and expressed their admiration for the ultra-modern, efficient equipment serving this enterprising community.

Rear view of Stromberg-Carlson Super Service Switchboard with gates open (Fig. 4)

Crapo GALVANIZED PRODUCTS

STEEL STRAND

Telephone and Telegraph Wire

Crapo Galvanized Wire and Steel Strand can be spliced and served without injury to the heavy, protective zinc coating. The perfect adhesion of this tough, ductile coating to the wire enables it to withstand sharp bending and twisting, produces corrosion-resisting joints, makes for longer life, lower maintenance costs.

Crapo Galvanized Seven-wire Steel Strand and Telephone Wire are readily available in all standard grades and sizes from representative Supply Jobbers.

INDIANA STEEL & WIRE CO.
MUNCIE, • INDIANA

BOUND VOLUMES
of
TELEPHONE ENGINEER

$1.75 Per Volume

Binding is of handsome Black Waterproof Buckram with Red Leather labels stamped in 23K gold.

Your Name Stamped On Front In Gold At No Additional Charge

This very low price is available because of the large number of bindings used by our readers. Simply forward your copies for the year you want and your check for $1.75. Binding will be made and forwarded back immediately by Express collect.

SHIP COPIES TO
TELEPHONE ENGINEER
185 N. WABASH AVE. CHICAGO

SUB-CYCLE

The MASTER Ringing Converter

Model "S"

PRICE $45.00

Equipt with Pulsator for Biased Ringing $55.00

Output 20 Watts, 90 Volts
Operates on 110 Volts A.C.

WILL HANDLE THE TOUGH JOBS

•

NO MOVING PARTS

CONTACTS NO VIBRATING

NO ROUTINE MAINTENANCE

NO RADIO INTERFERENCE

•

Sub-Cycle Provides Perfect Ringing Service

(For loads 40/50 watts, write for information about Model "C.")

LORAIN PRODUCTS CORPORATION, LORAIN, OHIO

Lorain Products Corporation is exclusive manufacturer for use and sale in United States. Address foreign inquiries to Automatic Electric Sales Co., Ltd., Chicago, Ill.

SOLD BY LEADING DISTRIBUTORS

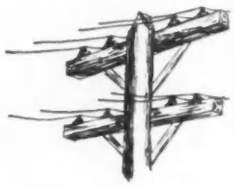
WB QUALITY WIRE And CORD Since 1900

Distributed and Guaranteed by GraybaR ELECTRIC COMPANY

The WHITNEY BLAKE CO.
NEW HAVEN CONN.

LONG LINES

R. A. Clark, Jr.



Location Of Cross-talk

THE location of cross-talk on long telephone lines is often a difficult and tedious process. In the past the methods have been more or less "cut and try" by sectionalizing the line and making tests. In some cases it is necessary to open the telephone line at a pole which is of course very undesirable.

The method described below is relatively simple and makes it possible to locate sources of cross-talk within ten or twenty miles in a section as long as 200 miles. The theory on which the method is based is the same as that covering the location of circuit irregularities by means of impedance frequency runs. A known unbalance of magnitude somewhat near that which is to be located is connected between the circuits preferably at a balance point in the open wire transposition system. The cross-talk caused by the unknown unbalance adds to and subtracts from cross-talk at the known location as the frequency is varied. The formula for the distance between the two unbalances is

$$D = \frac{S}{2F} \qquad (1)$$

Where D is the distance in miles between the two irregularities S is the speed of propagation along the wires ie about 180,000 miles per second for open wire, F is the frequency interval between peaks on the cross-talk frequency curve. The local unbalance can be either a resistor or a small condenser connected between one wire of each circuit. A resistor of ten to twenty thousand ohms will generally give satisfactory results or a condenser of approximately .001 mf or .002 mf may be used. The use of capacity to provide the local unbalance has the advantage that it will not seriously interfere with carrier or d-c morse operation. On the other hand, the resistance provides uniform cross-talk at all frequencies whereas the condenser results in comparatively small cross-talk at the low frequencies and large values at the high.

It is essential that the two circuits be terminated in the characteristic impedance of the line. Ordinarily a 600 ohm resistor in series with a 2 MF condenser will be suitable for open wire lines.

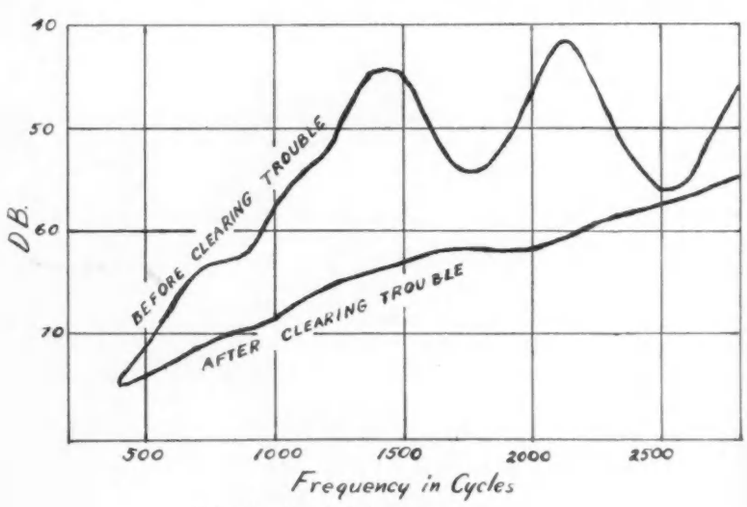


Fig. 2—Crosstalk frequency run.

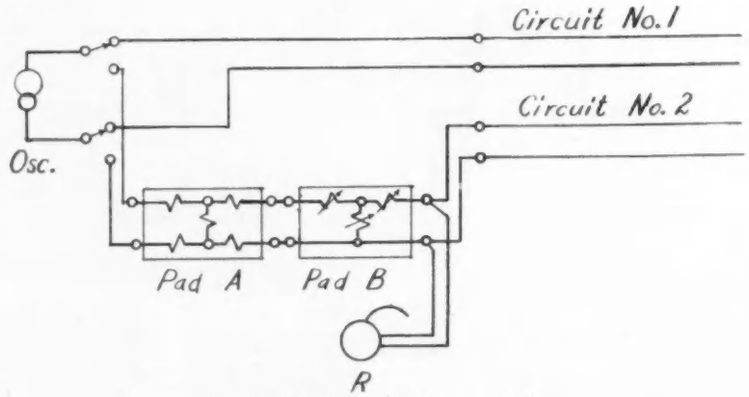


Fig. 1—Circuit for locating crosstalk.

When making tests on sections of open wire the networks should be placed at a balanced point in the transposition system.

Fig. 1 shows a simple circuit for making the cross-talk tests. The oscillator should be continuously variable and should have an output impedance of approximately 600 ohms. The beat frequency oscillators now on the market are very well suited for this work. Pad A should extend up to 80 db in steps of 20 db. Pad B should be continuously variable from zero up to about 25 db. There are several such units on the

market and they are relatively inexpensive. All of the pads should have an impedance of 600 ohms. The receiver should be of the high resistance type preferably 400 ohms or more.

A typical cross-talk frequency test is shown in Fig. 2. The computed location of the trouble is 128 miles. The error was found 113 miles away from the known unbalance. Where possible it is desirable to make two tests with the known unbalance at different points. This enables a check to be made on the location which often reduces the time necessary to locate the trouble.

If there is more than one source of cross-talk on a line the peaks in the curve may be so numerous that difficulty will be had in obtaining the location of any one trouble. In such cases it will be necessary to sectionalize the line so that there are only one or two unbalances in a section. — END —

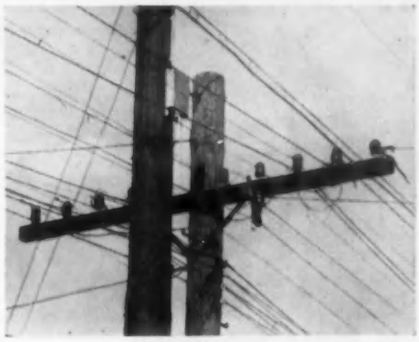
Charles E. Wells Selected By Oregon Independents

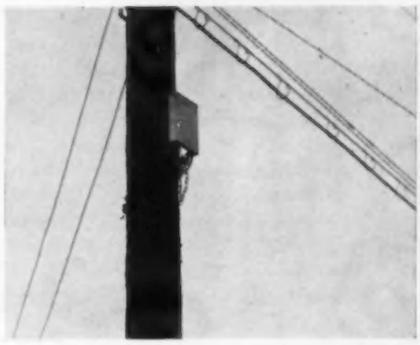
At the annual convention of the Oregon Independent Telephone Association at the Portland Hotel, Portland on June 27th, resulted in the selection of Charles E. Wells, owner of the Northwest Telephone Company, Redmond, as president succeeding former president, C. H. Miller of Dufur. As secretary they selected Leslie A. Gritten, West Coast Telephone Company. Selected as directors were George E. Muhle, Oregon-Washington Telephone Company, C. H. Miller, Mt. Hood Telephone Company, and Lowell E. Brown, Interurban Telephone Company.

Addresses were delivered by Louis Pitcher, executive vice president of the United States Independent Telephone Association, E. C. Russell, auditor of the Oregon Public Utilities Commission, R. C. Hummel, West Coast Telephone Company, John H. Carkin, Oregon State Tax Commissioner, and Joseph Wimmer of the Pacific Telephone & Telegraph Company.

According to the Associated Press, Ulner Hershel Green of Bowie, Texas, perspired as he picked up a telephone and fumblingly put through a call for supplies for the CCC camp where he was stationed. Then he wiped his brow and grinned self-consciously. "A feller never knows what he can do till he tries," he remarked. Green, who is 21, had just completed the first telephone call he ever made.

Spend Money to Save Money





THE largest single item of expense in an outside plant is Drop Wire.

Upper photograph shows part of the more than 6,000 feet of open wire and drop wire in a single block. Such congestion of drop wire produced a lot of trouble, expense and disruption of service.

Lower photograph shows the same location in cable. Three terminals were cut in this block. As a result, only 520 feet of drop wire were needed for the same number of subscribers and maintenance expense and service interruptions were practically eliminated.

Sufficient terminals not only assure short direct drops, but they also make available for use the maximum number of cable pairs.

Installation of cable and sufficient COOK TERMINALS means an investment that will produce better service, less maintenance and larger profits for you.

BE SAFE—ALWAYS SPECIFY

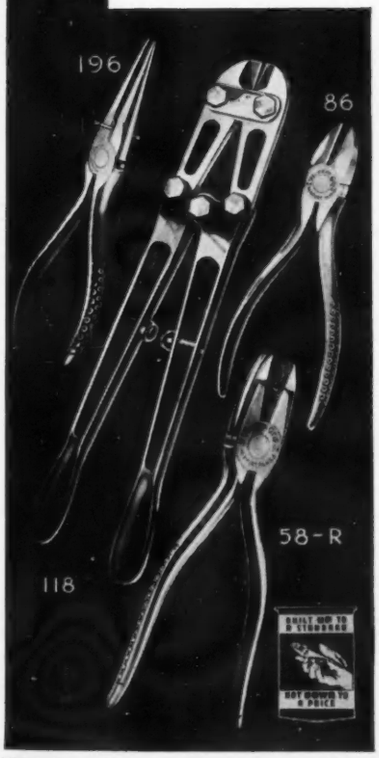
COOK

TERMINAL AND PROTECTION EQUIPMENT

COOK ELECTRIC CO.

2700 Southport Ave., Chicago

You don't have to be a tool expert in order to *Buy them Safely*



THE simplest of all business principles—getting the best value for your dollar—is the only guide you need in purchasing Vacuum Grip Pliers. No technical knowledge is needed. A simple running test, made with any pattern, will soon demonstrate that they represent a "greater-dollar-value." The four patterns illustrated are typical of the built-in stamina that is the keynote of Vacuum Grip long life and economy.

196—HEAVY DUTY NEEDLE NOSE. A powerful gripping and wire-cutting tool that gets into the hard-to-reach places. Very popular with electricians in all fields. Length 6"—$1.85; 195—5" $1.75. Without wire cutters: 96—6"—$1.50; 95—5"—$1.50.

118—BOLT & CABLE CUTTER. For cutting power, blade durability and structural strength there's nothing to equal this powerful overcapacity cutter. Handles of forged steel instead of easily broken malleable steel used in ordinary cutters. Cutting capacity 3/8"; length 18". Complete with side—out b'ades, $5.00. No. 114—length 14"—$4.00; 124—24"—$6.50; 136—36"—$9.00.

86—HEAVY DUTY DIAGONALS. Built for hard service and long wear. Tremendous cutting power. Length 6"—$2.00; 85—5"—$1.65.

58-R—PROFESSIONAL LINEMAN PLIERS. The most highly developed and most rugged tool of its type. Perfectly aligned double bevel cutters, deeply milled gripers, insulation stripper; easy-riding joint, tapered nose, perfect balance, fashioned handles. Length 8½"—$3.25; 57-R—7"—$2.50; 56-R—6"—$2.00.

PURCHASING AGENTS: Order one or two pairs for running tests. Ask for prices on 6 or more pairs. LINEMEN: Order a trial pair, purchase price to be refunded on return if, after 30 days, you are not 100% satisfied.

FORGED STEEL PRODUCTS CO., NEWPORT, PA.

Vacuum Grip Pliers — OVER A MILLION IN USE

Rambler Rambles Again

By J. A. SMITH

B'leve it or not but your June Telephone Engineer was hardly off the press before the "old boys" began to arrive in Gettysburg. The announced purpose of the gathering was for the annual reunion which has been their custom for more than fifty years. This one was different: both the blue and the grey participated for the first time. Well, it must have been interesting.

We've had private information that our "fall at Gettysburg" was thoroughly discussed by the fathers of some telephone executives who still survive and the evidence we produced was voted "concrete." Not a dint was found in either "exhibit A" or "exhibit B," the former still remains on the battlegrounds and the latter felt by Rambler.

Cal Sweet was among those who wrote to us to remind Rambler of his lax knowledge regarding historical data. We stand corrected as the battle was fought in 1863 (on July 1, 2 and 3 to be exact). But shux, we had no intention of trying to be technical in the matter of history. Confederate soldiers and their offspring have long forgotten about the Civil war or dates of battles. These matters are purely incidental as far as Rambler is concerned.

✦ ✦ ✦

Rambler chased off to Texas the latter part of June where he found old Sol and politics vieing for first place. Then along comes the president and tries to obscure the whole matter by spending a night in "our own home town." Be it remembered that the president has a son living near Fort Worth. Rambler tried his luck at fishing but he cannot compete with the president because of his limited? use of boats. Only fair luck attended our efforts.

✦ ✦ ✦

Back home again we tried for piscatorial honors over in Michigan with a somewhat greater degree of success. We're still not satisfied, however, and will probably try later. Some fellow comes along then and tries to take all the joy out of fishing by sticking the following doggerel under our nose:

Lord, grant this day I catch a fish
So large that even I,
In telling of it afterwards,
Shall have no need to lie."

Now, I ask candidly, what would you do if you caught up with the fellow who would question your "integry" by sending you such an imputation?

Chided the fellow we rented a camp cottage at the lake about the size of the fish in the lake or those caught out of the lake. "Oh," says he, "you remember the government instructions, everything must be reduced for 1938, and the fish seems to have taken the suggestion seriously."

✦ ✦ ✦

Our old friend William Swan, an employee of the Dallas telephone company passed away while Rambler was in Texas during June. He will be remembered by many who attended telephone conventions in Texas, having appeared on programs in traffic schools. Swan had spent many years in the telephone industry; he was 54 years at his passing.

✦ ✦ ✦

Our suggestion in last month's Rambling regarding a "fun department" has been commented upon quite generously by readers in the industry and by publishers outside the industry who frequently read Telephone Engineer. They were practically unanimous for such a column and a number sent in suggestions; probably next month we will add this feature. We would appreciate your comment.

✦ ✦ ✦

The Higgins family, globe-trotters deluxe, are somewhere in the west on another transcontinental tour. P. Kerr Higgins, well known telephone man of half a century, writes Rambler that he planned to leave St. Louis about July 10th for a three months tour of the Pacific coast. Since practically retiring from the telephone business a few years ago, Mr. and Mrs. Higgins have spent considerable time in seeing the United States, South America and Europe.

LET YOUR OPERATORS HELP THEMSELVES TO A FRESH, CLEAN "Cope" SANITARY PAPER NECKBAND EVERY DAY

DISTRIBUTED BY
AMERICAN AUTOMATIC LEICH SALES CORP.
KELLOGG SWITCHBOARD STROMBERG-CARLSON
ASK FOR SAMPLES AND PRICES

"Cope"

T. J. COPE, INC.
6122 VINE STREET PHILADELPHIA, PA.

TELERING

ECONOMY ◆ RELIABILITY

Order One NOW for a 30-day Free Trial

ONLY ONE CONTACT!

PRICE $44.00 EACH
F.O.B. Elyria

Reliable ringing service is essential in providing satisfactory telephone service.

Use TELERING and provide the MOST reliable service at the LEAST cost.

Current Consumption negligible

Positively No Radio Interference

Directly converts Commercial Alternating Current to Telephone Ringing Current.

You can always depend upon our full co-operation and prompt service.

Sold by Leading Telephone Distributors

TELKOR, Inc., Elyria, Ohio

HEMINGRAY Glass INSULATORS

For a long life of dependable low-cost service rely on Hemingray Pin-Type Glass Insulators.

No aging or deterioration .... unaffected by sudden temperature changes .... interval strains and stresses removed.... homogeneous in character, only one coefficient of expansion .... sustained high dielectric strength .... clear, flawless for easy inspection .... all surfaces impervious to moisture... tougher, improved glass to withstand rough handling. Write us about your requirements. We'll gladly send samples. Owens-Illinois Glass Company, Muncie, Indiana.

NO LUXURY TAXES AT

HOTEL HENRY

JUST SOLID COMFORT

Modestly, the Henry supplies the necessities of a good night's lodging, restful and refreshing, on an appropriate price scale. You pay no excess charges for glamour – overhead. An ideally located hotel, with good service, excellent food and genuine hospitality

PLEASANT ROOMS FROM $1.50 **FRANK PARKE Gen. Mgr**

PITTSBURGH

FIFTH AVE. AND SMITHFIELD

CLEVELAND'S

Providing every comfort and luxury at low cost. An exclusive hotel-home, ideally located in the center of things. Large beautiful rooms with private bath. . .Genuine hospitality. . .Free parking for guests.

R. M. BARNETTE, Manager

SPACIOUS ROOM WITH BATH $2.

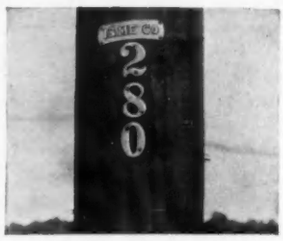
Low Monthly Rentals

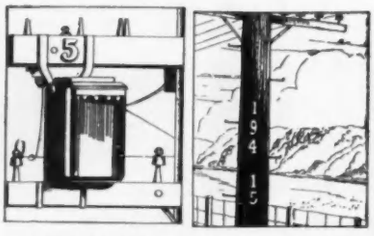
Hotel STERLING

PROSPECT AT EAST 30th

PREMAX

PREMAX LETTERS AND FIGURES of embossed brass or aluminum are available in a wide range of styles in ½ to 6-inch heights.





PREMAX MARKERS for poles, transmission lines, outlet boxes, terminals, etc., may be had in standard or special designs.

POWER & LIGHT CO

PREMAX EMBOSSED ALUMINUM POLE TAGS are available in any design with ½ to 1¼-inch letters, any length.

ABC Co

SEND FOR FREE BOOK TODAY

Premax Products

Division of Chisholm-Ryder Co., Inc.
3812 Highland Ave., Niagara Falls, N. Y.

Executives Elevated By Oliver Iron & Steel

Theodore F. Smith, executive vice president, was elected president of the Oliver Iron & Steel Corporation, following the elevation of Harry F. Devens, former president, to the chairmanship of the board at a recent meeting of the board of directors.

Chance Company Opens Eastern Office

The A. B. Chance Company, Centralia, Missouri, announces the opening of a New York office to promote the

Paul K. Rhoads

sale of the A. B. Chance Company and Tips Tool Company products in that territory.

The new office will be located at 50 Church Street, and will be under the supervision of Mr. Paul K. Rhoads, who is being transferred from the Centralia office where he has been sales manager of the Tips Tool division of the A. B. Chance Company. The new office was opened July 1st.

A Survey Footometer Offered

Pictured is an illustration of the Survey Footometer that is proving very popular among utilities companies; measuring distances, that is so necessary in that business.

The equipment includes the Footometer, coil spring, wheel carrier, running board bracket, door bracket, steering post bracket, drive cable, and fifth

OLIVER

POLE LINE MATERIAL

A good specification - always!

OLIVER WESTERN UNION PINS MADE TO THE MOST EXACTING SPECIFICATIONS . . . . . .

Oliver Western Union Pins are forged from high carbon, mild open hearth steel and are equipped with the best grade of oak cobs which have been thoroughly boiled in paraffine to exclude all moisture. Available in long shank, short shank and lag screw type.

OLIVER IRON and STEEL CORP.
PITTSBURGH, PA.

OLIVER POLE LINE MATERIALS

APPROVED AND ACCEPTED SINCE 1894

OLIVER

wheel and arm assembly complete. The equipment is the same for any car and can be attached in a few minutes without the aid of a mechanic. Likewise, it can be transferred easily, and without alteration, from one car to another. Accuracy in measurement is obtained by using a standard bicycle balloon tire, and practically no air pressure, which prevents bouncing of the wheel and eliminates the effect of tire pressure variation.

Bulletins describing same can be obtained from the Speedometer Service Company, 131 Fell Street, San Francisco or from the editor.

New Neon Type Indicating Lamp

A new product of the H. R. Kirkland Company has just been announced. The company, manufacturers of a line of indicating and annunciator units, describe three new products which are now being distributed by Graybar.

One of them is a new Neon Lamp unit to be used with the GE Co T4½-3000 hour lamp life-one-quarter watt bulb. This neat small unit with a plastic lense cap, is single hole mounted and available with a designation strip, etc.

Other products are a 120 type bayonet base indicating unit for applications where vibration exists. It is also single hole mounted. The other new product is the No. 180 type unit which is with a 2" beehive lense, suitable for certain silent signals, etc., for desk and wall mounting. Also for over-door signals. For voltages up to 120 volts.

Circular sheet giving all details of the above mentioned products are available and may be obtained from any Graybar office or directly from the *H. R. Kirkland Company, Morristown, New Jersey.* Ask for circular sheet No. 3138. A number of these are available from the editor of TELEPHONE ENGINEER and will be sent on your request.

Leich Sales Offers Handsets In Color

Leich Sales Corporation announces that the entire line of Leich handsets is now available in a variety of colors as well as the conventional black. Production of the colored instruments was begun recently in the company's factory at Genoa, Illinois, and the first shipments of the new telephones have been made to the company's customers. The colors offered include brilliant red, maroon, ivory, blue, and "clear."

In presenting the colored handsets, Mr. R. G. Faulhaber, Vice-President, commented as follows:

"With our intimate knowledge of telephone company problems we do not anticipate that any large number of col-

"Remanufacturing" BELONGS to Suttle!

The word, "Remanufacturing" was invented by Suttle. It was "coined" because a new word was needed to describe the methods used by Suttle in manufacturing telephones.

The method was different from anything that had ever been done before and there was no word in existence that fitted it.

That all happened eight years ago ,and yet today no other competitor has ever learned how to use our methods. "Remanufacturing" is still an exclusively Suttle process.

The dependable performance and economy provided by it are still available only from Suttle.

Other people have borrowed the word, but they can't borrow the "know how." Remanufacturing costs slightly more but it's worth it.

When you have old telephone equipment you want to cash in on, use the genuine Suttle Remanufacturing.

If you want to know more about it, write us for further details or ask for our representative to call on you.

SUTTLE EQUIPMENT COMPANY

LAWRENCEVILLE, ILLINOIS

A GRIP FOR ALL NEEDS

No. 1628-5 B.
"Chicago" Grip.
Maximum opening .563.
Minimum opening .115.
Safe Load, 8,000 lbs.

Here's the new "Chicago" Grip capable of handling messenger or guy strand from 3/16 in. diameter up to ½ in. diameter. A genuine all purpose grip that can also be used satisfactorily on bare conductors, solid or stranded, from No. 6 to No. 4/0 seven strand copper and A.C.-S.R. up to No. 3/0. A grip that even satisfactorily handles the new three-strand "copperweld" conductor. The bronze-lined jaws prevent slippage. This new grip will afford a sure hold under all conditions, with loads up to 8,000 lbs.

DISTRIBUTED THROUGH JOBBERS

Foreign Distributor: International Standard Electric Corp., New York

The four pamphlets listed below will be sent without charge to anyone interested. Check the ones you want:

- ☐ Safety for the Pole Climber.
- ☐ Specifications on Linemen's Belts and Safety Straps.
- ☐ The Safety Factor on Linemen's Leather Goods.
- ☐ Pocket Tool Guide.

Mathias KLEIN & Sons
Established 1857 — Chicago, Ill. U.S.A.
1200 BELMONT AVENUE

The Clearing House

For the convenience of readers of Telephone Engineer

Accounting Systems

Bowdle Accounting System

A complete Accounting Service For Telephone Companies.

Box 642

WHEATON, ILLINOIS

Engineer-Construction

R. S. SHELY

CONSTRUCTION ENGINEER

LIGHT-POWER-TELEPHONE LINES

SWITCHBOARDS AND CABLES INSTALLED

20 YEARS ACTIVE EXPERIENCE

330 Dudley Road Lexington, Ky.

SITUATION WANTED—Telephone Man wants position. 17 years experience as lineman, head lineman, installer, sub station and P. BX of all types. Has technical and practical knowledge of teletypewriter and repeater circuits. Also know Railroad Dispatching and Tel. Systems. 35 years old and free to travel. References. Answer: F. T. Crowley, 2 Russell Ave., Nashua, N. H.

WANTED TO BUY—Telephone exchange in small town of up to 2500 population, preferably some exchange that is old and more less out-of-date for building up and modernizing. I am ready to buy. Address J. E. c/o Telephone Engineer.

Telephone Directories

Telephone Bldg. Kansas City, Mo.
Citizens Trust Bldg. Ft. Wayne, Ind.
135 S. Second St. Philadelphia, Pa.

ored handsets will be installed for several years. Manufacturing costs of these sets is considerably higher and production necessarily limited; consequently, the price of colored handsets is higher than for corresponding black sets. Unless telephone companies can obtain a substantial extra rate to compensate for the higher cost and the additional expenses of stock a variety of colors, the installation of colored telephones cannot be considered sound operating practices at the present time."

"From the long-term, however, colored telephones have a greater significance. As the public becomes educated to the idea of color in telephones more and more of these instruments will be placed in service, and ultimately colored telephones will be generally accepted. In the meantime, however, it appears that most telephone companies will judiciously place a few colored telephones where they are wanted and where the subscribers are willing to pay for the additional expense."

Complete details and prices of the new Leich handsets in color may be obtained by writing the company at 222 West Adams Street, Chicago.

Repair Company For Time Clocks

The discarding of expensive time telling and recording instruments, due to the unavailability of replacement parts which have been discontinued by the manufacturer, is no longer necessary.

This costly problem among industrial and other concerns has been met by a newly organized firm, the GENERAL TIME SERVICE, located at 1507 W. Vliet St., Milwaukee.

This new firm specializes in repairing and reconditioning time equipment requiring the actual fabrication of obsolete parts, wheels, pinions, gears, etc. They also are especially equipped to repair any type of modern time instruments used in specialized telephone equipment applications.

The personnel of this newly organized firm includes craftsmen experienced on such pieces as watches, stop watches, repeaters, ships' chronometers, program clocks, time switches, control clocks, etc.

This new organization is prepared to offer its services throughout the entire country.

Poles

Carney

CEDAR POLES

Plain or Butt Treated

B. J. CARNEY & CO.

100 No. 7th St. Minneapolis

Finished Cedar Poles

VALENTINE CLARK CORPORATION

St. Paul, Minn.

Telephone Directories

Telephone Directory

ADVERTISING

Write or telephone for proposition

L.M.BERRY & CO.

Call L.D.16-Telephone Bldg., Dayton, O.

Telephone Engineers

J. G. WRAY & CO.

Telephone Engineers

Specialists in Appraisals, Rate Surveys, Financial Investigations, Organization and Operation of Telephone Companies

105 West Adams Street

CHICAGO

J. W. WOPAT

CONSULTING ENGINEER

Telephone Engineering — Construction Supervision — Appraisals — Financial — Rate Investigations

303 East Berry Street

Fort Wayne, Indiana

Time Clocks

Specialists in Reconditioning

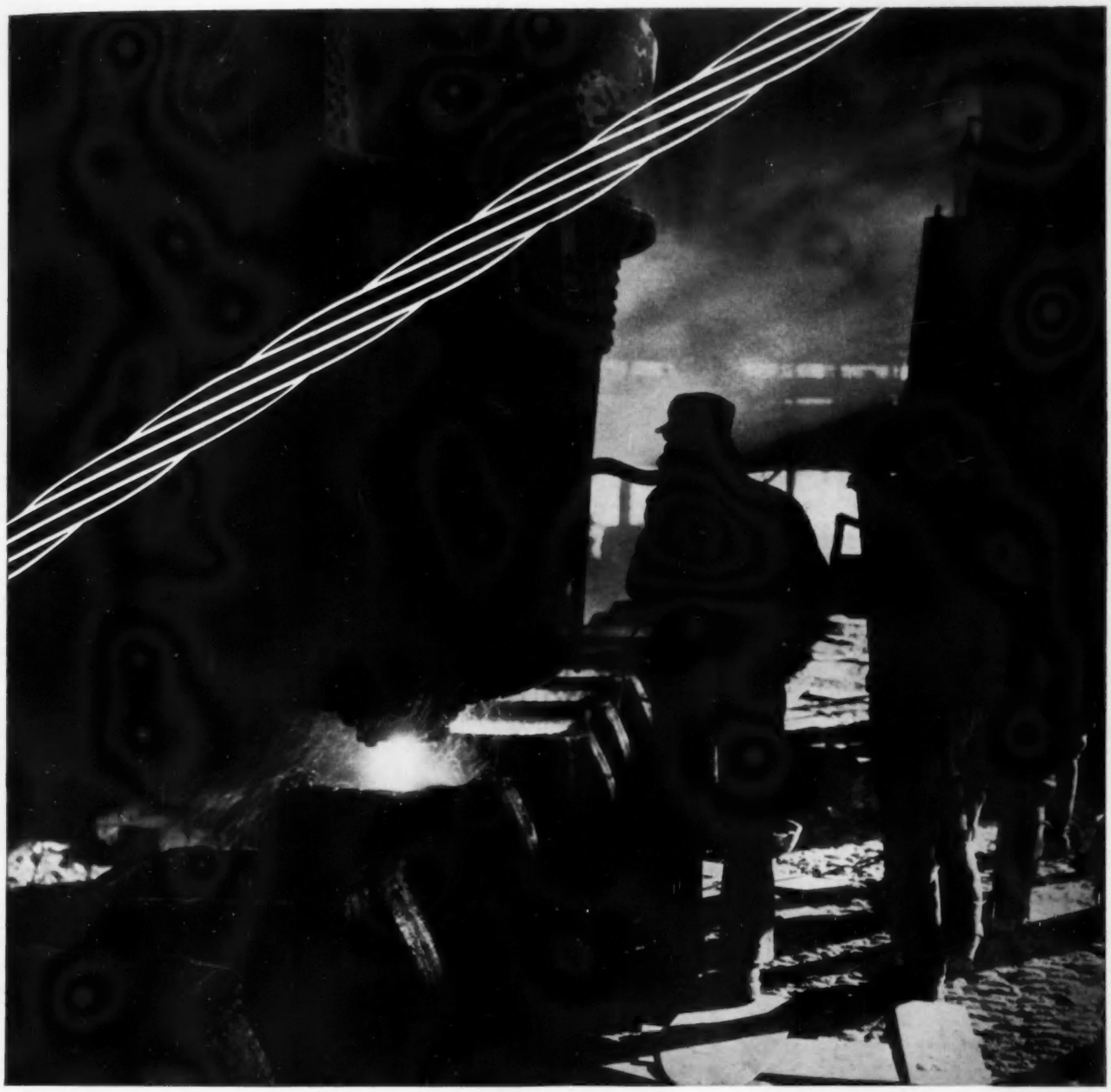
WATCHES & CLOCK CONTROLLED DEVICES FOR SPECIALIZED TELEPHONE APPLICATIONS

Parts for obsolete equipment made to order

Send for list of Rebuilt watches and Clock controlled instruments

GENERAL TIME SERVICE

1507 W. Vliet St. Milwaukee



A set-up for meeting special requirements in strand

WHEN special characteristics are required in strand, the place to begin is at the open-hearth furnace. The complete integration of all manufacturing operations under Bethlehem's system of control, beginning with steel making and following through all subsequent phases, is an important factor in making strand to meet special conditions.

BETHLEHEM STEEL COMPANY